

REMARKS

Claims 1, 2 and 4-16 are pending in this application. By this Amendment, claims 1 and 10 are amended. Claim 10 is amended to correct a typographical error therein.

No new matter is added to the application by this Amendment. Support for the features added to claim 1 can be found in paragraphs [0008], [0009], [0011] and [0021] of U.S. Patent Publication 2007/0158256 (hereinafter “the 256 publication”) for the present application. The above-identified paragraphs of the 256 publication make clear that the permeate circulation circuit maintains a continuous flow of permeate into the permeate side of the filter housing both when the shut-off valve is open and closed. Further support that the permeate circulation circuit maintains flow of permeate into the permeate side of the filter housing when the shut-off valve is closed is found in claim 1, in, for example, the feature “a permeate buffer in the permeate circulation circuit configured to feed the permeate circulation pump during the closed condition of the shut-off valve.”

Reconsideration of the application is respectfully requested.

I. Rejections Under 35 U.S.C. §103

A. Lawrence et al. in view of Castelas et al.

Claims 1, 2, 4, 5, 9 and 11-16 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,958,243 to Lawrence et al. (hereinafter “Lawrence”) in view of FR 2586202 to Castelas et al. (hereinafter “Castelas”). The rejection is respectfully traversed.

Prior to discussing the merits of the Examiner's position, the undersigned reminds the Examiner that the determination of obviousness under § 103(a) requires consideration of the

factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1 [148 USPQ 459] (1966): (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of nonobviousness. *McNeil-PPC, Inc. v. L. Perrigo Co.*, 337 F.3d 1362, 1368, 67 USPQ2d 1649, 1653 (Fed. Cir. 2003). There must be some suggestion, teaching, or motivation arising from what the prior art would have taught a person of ordinary skill in the field of the invention to make the proposed changes to the reference. *In re Fine*, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). But see also *KSR International Co. v. Teleflex Inc.*, 82 USPQ2D 1385 (U.S. 2007).

A methodology for the analysis of obviousness was set out in *In re Kotzab*, 217 F.3d 1365, 1369-70, 55 USPQ2d 1313, 1316-17 (Fed. Cir. 2000) A critical step in analyzing the patentability of claims pursuant to section 103(a) is casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one "to fall victim to the insidious effect of a hindsight syndrome wherein that which only the invention taught is used against its teacher."

It must also be shown that one having ordinary skill in the art would reasonably have expected any proposed changes to a prior art reference would have been successful. *Amgen, Inc. v. Chugai Pharmaceutical Co.*, 927 F.2d 1200, 1207, 18 USPQ2d 1016, 1022 (Fed. Cir. 1991); *In re O'Farrell*, 853 F.2d 894, 903-04, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988); *In re Clinton*, 527 F.2d 1226, 1228, 188 USPQ 365, 367 (CCPA 1976). "Both the suggestion and the expectation of

success must be founded in the prior art, not in the applicant's disclosure." *In re Dow Chem. Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988).

The Patent Office acknowledges that Lawrence fails to teach or suggest a controller adapted to operate the shut-off valve at a high frequency. The Patent Office introduces Castelas as allegedly remedying the deficiencies of Lawrence by allegedly teaching a process having a filter 1, shut-off valve 7 and a controller 14 adapted to operate the shut-off valve as shown in Fig. 1 of Castelas. The Patent Office alleges that it would have been obvious to provide the shut-off valve disclosed by Lawrence with a controller, as taught by Castelas, in order to automatically operate the valve and since the court held that broadly providing an automatic or mechanical means to replace a manual activity which accomplished the same result is not sufficient to distinguish over the prior art. Applicants respectfully disagree with the allegations by the Patent Office.

Not only does Lawrence fail to teach a controller adapted to operate the shut-off valve at a high frequency as acknowledged by the Patent Office, Lawrence also fails to teach or suggest (a) at least one permeate circulation circuit which is, on the one side, connected, by an inlet, to the permeate discharge pipe at a point downstream of the shut-off valve and, on the other side, by an outlet, to the permeate side of the filter housing, wherein a permeate circulation pump is provided in the permeate circulation circuit, wherein the permeate circulation circuit has a configuration adapted to maintain a continuous flow of permeate into the permeate side of the filter housing and (b) a permeate buffer in the permeate circulation circuit configured to feed the permeate circulation pump during the closed condition of the shut-off valve as required by

amended claim 1.

Lawrence discloses to a membrane filtration system that utilizes a known back-washing method to dislodge retentate from a filter. However, the known back-washing method of Lawrence is an inferior method that does not operate satisfactory for the following two reasons:

1. Lawrence's back-washing includes periodically stopping the filtration process for a significant amount of time, typically for a period on the order of seconds to minutes. During these periods, bulk volumes of permeate are driven backwards through the filter. This not only means that the production of the permeate is periodically stopped, but also that the filtration process is effectively reversed, in that permeate is pumped back into the retentate side of the filter, where it mixes with unfiltered process fluid. As a result, the unfiltered process fluid contaminates the permeate pumped back into the retentate side, which must subsequently be re-filtered or discarded; and

2. Whenever Lawrence's back-washing period commences, the bulk volumes driven backwards through the filter (as mentioned above) still have to be set in motion which further impairs the capacity of the filtration process. It takes time to overcome the inertia of the fluid driven backwards through the filter, and such time, from the viewpoint of the filtration process, is lost to production for each back-washing occurrence.

The present invention overcomes the problems associated with Lawrence's back-washing method by providing a permeate circulation circuit having a configuration adapted to maintain a continuous flow of permeate into the permeate side of the filter housing. The momentum of the flow in the permeate circulation circuit is largely maintained throughout the filtration process

according to the present invention, thereby overcoming the above-identified prior art problem with overcoming the inertia of the fluid. As a result, periodical closure of the shut-off valve leads to a rapid pressure buildup, while after opening the shut-off valve again, normal operation is quickly resumed. The periodic rapid pressure buildup on the permeate side of the filter effects a back-pulse resembling a shock-wave, which effectively dislodges retentate from the filter, but which is not accompanied by the transfer of bulk volumes of fluid from the permeate side of the filter to the retentate side thereof. Accordingly, the above-identified problem regarding driving bulk volumes of permeate backwards through the filter is also overcome by the present invention.

The embodiment in Fig. 3 of Lawrence (generally described in col. 4, line 6 – col. 8, line 25) is configured to operate such that, in its filtration mode, at least valves 13 and 14 are closed (see col. 5, lines 9-11). Accordingly, there is no permeate circulation circuit in which a continuous flow of permeate is maintained. Instead, the pipe section including valve 14 holds fluid that, each time the system switches from filtration mode to backwash mode, must be set in motion. Further, during the backwash process, which may last tens of seconds (see col. 10, lines 15-30), valves 13 and 14 are opened and bulk volumes of permeate are pumped from the storage tank 19 into chamber 5 of the filtration module 2 (see col. 6, lines 1-10). Thus, the operation of membrane filtration system according to Lawrence does not teach or suggest the combined features of the present invention.

Lawrence fails to teach or suggest (a) the presently claimed controller and (b) the presently claimed permeate circulation circuit having a configuration adapted to maintain a continuous flow of permeate into the permeate side of the filter housing as recited in the present

claims. Specifically, the configurations according to Lawrence fails to teach or suggest the claimed configuration of the permeate circulation circuit because Lawrence does not teach an embodiment of a permeate circulation circuit (i) that is connected, by an inlet, to the permeate discharge pipe at a point downstream of the shut-off valve, (ii) that is connected, by an outlet, to the permeate side of the filter housing, (iii) wherein a permeate circulation pump is provided, and (iv) that comprises a permeate buffer that is configured to feed the permeate circulation pump during the closed condition of the shut-off valve.

For example, in the embodiment in Fig. 3 of Lawrence, the pipe segment running through valves 9, 11 and 18, which may be supplemented by the pipe segment that runs through valves 12 and 13, may be considered similar to a permeate discharge pipe, as all permeate to be discharged must necessarily pass through it. Present claim 1 requires that the permeate circulation circuit connects to the discharge pipe at a point downstream of the shut-off valve (i.e., valve 9) and leads back to the permeate side of the filter housing. The (vertically drawn) pipe segment of Lawrence that passes through valve 14 may be considered a permeate circulation circuit. However, with these designations, the circulation pump 15 of Lawrence is not disposed within the permeate circulation circuit. Accordingly, Lawrence's membrane filtration system is differently configured to operate in a different manner than required by the present claims. Therefore, Lawrence fails to teach or suggest the specifically defined permeate circulation circuit and permeate buffer as recited in claim 1.

Castelas fails to remedy the deficiencies of Lawrence because Castelas fails to teach (a) at least one permeate circulation circuit which is, on the one side, connected, by an inlet, to the

permeate discharge pipe at a point downstream of the shut-off valve and, on the other side, by an outlet, to the permeate side of the filter housing, wherein a permeate circulation pump is provided in the permeate circulation circuit, wherein the permeate circulation circuit has a configuration adapted to maintain a continuous flow of permeate into the permeate side of the filter housing, and (b) a permeate buffer in the permeate circulation circuit configured to feed the permeate circulation pump during the closed condition of the shut-off valve.

Accordingly, Lawrence and Castelas, taken singly or in combination, do not teach or suggest at least one permeate circulation circuit which is, on the one side, connected, by an inlet, to the permeate discharge pipe at a point downstream of the shut-off valve and, on the other side, by an outlet, to the permeate side of the filter housing, wherein a permeate circulation pump is provided in the permeate circulation circuit, wherein the permeate circulation circuit has a configuration adapted to maintain a continuous flow of permeate into the permeate side of the filter housing as recited in claim 1. Moreover, Lawrence and Castelas, taken singly or in combination, do not teach or suggest a permeate buffer in the permeate circulation circuit configured to feed the permeate circulation pump during the closed condition of the shut-off valve as required by claim 1.

Because the features of independent claim 1 are neither taught nor suggested by Lawrence and Castelas, taken singly or in combination, these references would not have rendered obvious, the features specifically defined in claim 1 and its dependent claims.

For at least these reasons, claims 1, 2, 4, 5, 9 and 11-16 are non-obvious in view of Lawrence and Castelas. Reconsideration and withdrawal of the rejections of the claims under

35 U.S.C. §102(b) are respectfully requested.

B. Lawrence and Castelas in view of Storkebaum et al.

Claims 6-8 and 10 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Lawrence and Castelas in view of U.S. Patent No. 4,749,476 to Storkebaum et al. (hereinafter "Storkebaum"). The rejection is respectfully traversed.

Storkebaum does not remedy the deficiencies of Lawrence and Castelas as described above with respect to claim 1, from which claims 6-8 and 10 directly or indirectly depend. Storkebaum fails to remedy the deficiencies of Lawrence and Castelas because Storkebaum does not teach or suggest the presently claimed permeate circulation circuit and permeate buffer.

Thus, Lawrence, Castelas Storkebaum, taken singly or in combination, do not teach or suggest (a) at least one permeate circulation circuit which is, on the one side, connected, by an inlet, to the permeate discharge pipe at a point downstream of the shut-off valve and, on the other side, by an outlet, to the permeate side of the filter housing, wherein a permeate circulation pump is provided in the permeate circulation circuit, wherein the permeate circulation circuit has a configuration adapted to maintain a continuous flow of permeate into the permeate side of the filter housing, and (b) a permeate buffer in the permeate circulation circuit configured to feed the permeate circulation pump during the closed condition of the shut-off valve as recited in claim 1.

Because these features of independent claim 1 are not taught or suggested by Lawrence, Castelas and Storkebaum, taken singly or in combination, these references would not have rendered the features of claim 1 and its dependent claims obvious to one of ordinary skill in the art.

For at least these reasons, claims 6-8 and 10 are patentable over Lawrence, Castelas and Storkebaum. Thus, withdrawal of the rejection under 35 U.S.C. §103(a) is respectfully requested.

II. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1, 2 and 4-16 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Early and favorable action is earnestly solicited.

CONDITIONAL PETITION FOR EXTENSION OF TIME

If entry and consideration of the amendments above requires an extension of time, Applicants respectfully request that this be considered a petition therefor. The Commissioner is authorized to charge any fee(s) due in this connection to Deposit Account No. 14-1263.

ADDITIONAL FEE

Please charge any insufficiency of fees, or credit any excess, to Deposit Account No. 14-1263.

Respectfully submitted,
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